

**Installation
Guide**

hp StorageWorks SAN Switch 2/32 Version 4.2.x

Fourth Edition (May 2004)

Part Number: AA-RTQVD-TE

This installation guide provides basic procedures for setting up, configuring, and managing the SAN Switch 2/32 and SAN Switch 2/32 power pack models.



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SAN Switch 2/32 Version 4.2.x Installation Guide
Fourth Edition (May 2004)
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about this guide

This installation guide provides information to help you:

- Set up and configure the HP StorageWorks SAN Switch 2/32.
- Maintain and operate the switch.

This preface discusses the following topics:

- [Audience](#), page 8
- [Related Documentation](#), page 8
- [Conventions](#), page 8
- [Rack Stability](#), page 11
- [Getting Help](#), page 11

Audience

This book is intended for use by customers who purchased the SAN Switch 2/32, and for authorized service providers who are experienced with the following:

- Configuration aspects of customer Storage Area Network (SAN) fabrics
- Customer host environments, such as Windows® 2000, Windows NT®, and IBM AIX
- Web Tools Graphical User Interface (GUI), for configuring the switch via a supported Web browser

Related Documentation

For a list of related documents included with this product, see the Related Documents section of the *HP StorageWorks Fabric OS 4.2.x Release Notes*.

For the latest information, documentation and firmware releases, please visit the following HP StorageWorks website:

<http://www.hp.com/country/us/eng/prodserv/storage.html>

For information about Fibre Channel standards, visit the Fibre Channel Association web site, located at:

<http://www.fibrechannel.org>

Conventions

Conventions consist of the following:

- [Document Conventions](#)
- [Text Symbols](#)
- [Equipment Symbols](#)

Document Conventions

The document conventions included in [Table 1](#) apply in most cases.

Table 1: Document Conventions

Element	Convention
Cross-reference links	Blue text: Figure 1
Key and field names, menu items, buttons, and dialog box titles	Bold
File names, application names, and text emphasis	<i>Italics</i>
User input, command and directory names, and system responses (output and messages)	Monospace font COMMAND NAMES are uppercase monospace font unless they are case sensitive
Variables	<monospace, italic font>
Website addresses	Blue, underlined sans serif font text, for example: http://www.hp.com

Text Symbols

The following symbols may be found in the text of this guide. They have the following meanings.



WARNING: Text set off in this manner indicates that failure to follow directions in the warning could result in bodily harm or death.



Caution: Text set off in this manner indicates that failure to follow directions could result in damage to equipment or data.

Note: Text set off in this manner presents commentary, sidelights, or interesting points of information.

Equipment Symbols

The following equipment symbols may be found on hardware discussed in this document:



Any enclosed surface or area of the equipment marked with these symbols indicates the presence of electrical shock hazards. Enclosed area contains no operator serviceable parts.

WARNING: To reduce the risk to personal injury from electrical shock hazards, do not open this enclosure.



Any RJ-45 receptacle marked with these symbols indicates a network interface connection.

WARNING: To reduce the risk of electrical shock, fire, or damage to the equipment, do not plug telephone or telecommunications connectors into this receptacle.



Any surface or area of the equipment marked with these symbols indicates the presence of a hot surface or hot component. Contact with this surface could result in injury.

WARNING: To reduce the risk to personal injury from a hot component, allow the surface to cool before touching.



Power supplies or systems marked with these symbols indicate the presence of multiple sources of power.

WARNING: To reduce the risk to personal injury from electrical shock, remove all power cords to completely disconnect power from the power supplies and systems.



Any product or assembly marked with these symbols indicates that the component exceeds the recommended weight for one individual to handle safely.

WARNING: To reduce the risk to personal injury or damage to the equipment, observe local occupational health and safety requirements and guidelines for manually handling material.

Rack Stability

Rack stability protects personnel and equipment.



WARNING: To reduce the risk of personal injury or damage to the equipment, be sure that:

- The leveling jacks are extended to the floor.
 - The full weight of the rack rests on the leveling jacks.
 - In single rack installations, the stabilizing feet are attached to the rack.
 - In multiple rack installations, the racks are coupled.
 - Only one rack component is extended at any time. A rack may become unstable if more than one rack component is extended for any reason.
-

Getting Help

If you still have a question after reading this guide, contact an HP authorized service provider or access our website: <http://www.hp.com>.

HP Technical Support

In North America, call technical support at 1-800-652-6672, available 24 hours a day, 7 days a week.

Note: For continuous quality improvement, calls may be recorded or monitored.

Outside North America, call technical support at the nearest location. Telephone numbers for worldwide technical support are listed on the HP website under support: <http://thenew.hp.com/country/us/eng/support.html>.

Be sure to have the following information available before calling:

- Technical support registration number (if applicable)
- Product serial numbers
- Product model names and numbers
- Applicable error messages
- Operating system type and revision level
- Detailed, specific questions

HP Storage Website

The HP website has the latest information on this product. Access storage at <http://thenew.hp.com/country/us/eng/prodserv/storage.html>. From this website, select the appropriate product or solution.

HP Authorized Reseller

For the name of your nearest HP authorized reseller:

- In the United States, call 1-800-345-1518
- In Canada, call 1-800-263-5868
- Elsewhere, see the HP website for locations and telephone numbers: <http://www.hp.com>.

Overview

1

The HP StorageWorks SAN Switch 2/32 is a high-performance, 32-port, 2 gigabit (Gb) Fibre Channel switch that interconnects storage devices, hosts, and servers in a Storage Area Network (SAN). It integrates Fabric Operating System (FOS) firmware version 4.2.x or later, and is compatible with the HP StorageWorks switch product family. The SAN Switch 2/32 operates in a fabric containing multiple switches, or as the only switch in the fabric.

This chapter provides the following information:

- [SAN Switch 2/32 Features](#), page 14
- [Optional Hardware Kits](#), page 17

The HP StorageWorks SAN Switch 2/32 is offered in two configurations; the 2/32 and 2/32 power pack. Refer to the *HP StorageWorks Fabric OS 4.2.x Release Notes* for a complete list of management features enabled on your specific switch.

Note: This guide refers to both models as the SAN Switch 2/32, unless otherwise noted.

SAN Switch 2/32 Features

This section provides feature-specific information.

Firmware

The SAN Switch 2/32 operates using FOS firmware version 4.2.x. The firmware supports:

- An optional Security feature, which provides security mechanisms at all vulnerable points in a SAN fabric, from hosts to storage at the port, switch, and fabric levels.
- High-speed data traffic using Interswitch Link (ISL) trunking technology
- Automatic rerouting through the Fabric Shortest Path First (FSPF) algorithm
- Application Programming Interface (API), which is a protocol that allows applications to interface with switch services
- Per port statistics, which help technicians diagnose and isolate problem ports without disrupting switch operations
- Error detection and fault isolation
- Industry standard Management Information Base (MIB) support
- Automatic self-discovery
- Advanced Web Tools, which is an integrated Graphical User Interface (GUI), to manage the SAN from a browser

Hardware

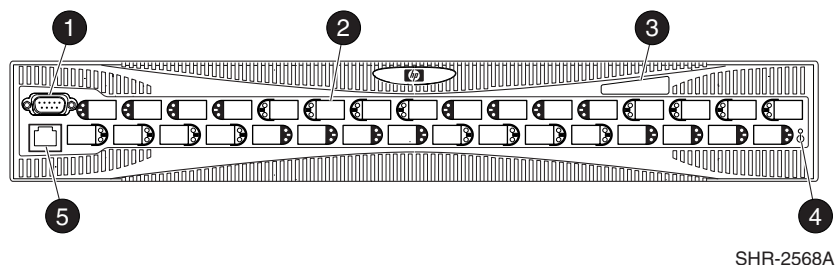
The SAN Switch 2/32 consists of the following components:

- An air-cooled 1.5-Unit chassis that can be set up as a stand-alone unit or mounted in a standard Electronic Industries Association (EIA) 19-inch rack
- 32 Fibre Channel ports
- One RS-232 Serial port, designed to connect to a DTE port
- One 10/100 Mb/s Ethernet port with an RJ-45 connector
- Two redundant power supplies, with AC switches and built-in fans
- Three redundant fan assemblies, hot-swappable if replaced one at a time
- A field-replaceable motherboard assembly enclosed in a grounded EMI cage

- Slide Rack Mount Kit
- The following LED indicators:
 - Switch Power/Status LED on the port side of the switch
 - Port Readiness LED on the non-port side of the switch
 - Port Status LED and Port Speed LED for each port
 - Power LED on each power supply
 - Fan Failure LED on each fan assembly

Port Side of the SAN Switch 2/32

Figure 1 shows the port side of the SAN Switch 2/32.



- | | |
|----------------------|-----------------|
| ❶ Serial port | ❹ Power switch |
| ❷ Fibre Channel port | ❺ Ethernet port |
| ❸ IP address label | |

Figure 1: Port side of the SAN Switch 2/32

Optical Ports

The Fibre Channel ports are numbered from left to right, with ports 0–15 in the lower row and ports 16–31 in the upper row. The ports provide the following functionality:

- Automatic negotiation to highest common speed of all devices connected to the port
- Port interfaces compatible with Small Form Factor Pluggable (SFP) transceivers, both short wavelength (SWL) and long wavelength (LWL)

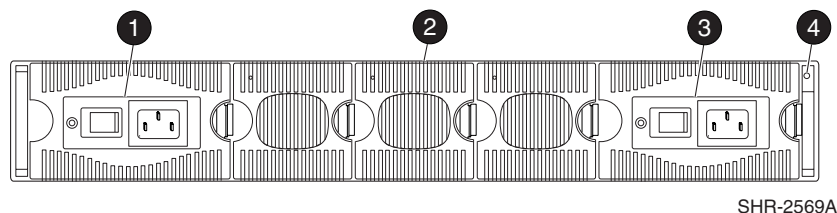
- Universal and self-configuring: capable of becoming an F_Port (fabric enabled), FL_Port (fabric loop enabled), or E_Port (expansion port).

The ports are color-coded into groups of four to indicate which ports can be used in the same Interswitch Link (ISL) trunking group.

Note: ISL Trunking is an integrated software component that enables ISL trunking groups between adjacent switches. For more information about trunking, refer to the *HP StorageWorks Fabric OS 4.2.x Features User Guide*.

Fan Assembly Side of the SAN Switch 2/32

Figure 2 shows the fan assembly side of the SAN Switch 2/32. This side houses the fans with corresponding LEDs, power supplies, and the port readiness LED.



- | | |
|-------------------------|----------------------|
| ❶ Power supply | ❸ Power supply |
| ❷ Fan assembly (1 Of 3) | ❹ Port readiness LED |

Figure 2: Fan assembly side of the SAN Switch 2/32

Optional Hardware Kits

HP provides the optional hardware kits in support of the SAN Switch 2/32 shown in [Table 2](#).

Table 2: SAN Switch 2/32 Orderable Hardware

Accessory	Part Number
Short wavelength SFP	A6515A* or 300834-B21**
Long wavelength SFP, 10 km	A6516A* or 300835-B21**
2m LC-to-LC Fibre Channel (fc) cable	C7524A*
2m LC-to-LC multimode fc cable	221692-B21**
16m LC-to-LC fc cable	C7525A*
5m LC-to-LC multimode fc cable	221692-B22**
50m LC-to-LC fc cable	C7526A*
15m LC-to-LC multimode fc cable	221692-B23**
200m LC-to-LC fc cable	C7527A*
30m LC-to-LC multimode fc cable	221692-B26**
50m LC-to-LC multimode fc cable	221692-B27**
2m LC-to-SC fc cable	C7529A*
2m LC-to-SC multimode fc cable	221691-B21**
16m LC-to-SC fc cable	C7530A*
5m LC-to-SC multimode fc cable	221691-B21**
15m LC-to-SC multimode fc cable	221691-B23**
30m LC-to-SC multimode fc cable	221691-B26**
50m LC-to-SC multimode fc cable	221691-B27**
SC female to SC female adapter	C7534A*
2m LC male to SC male adapter kit	C7534A*

* Premerger HP part number

** Premerger Compaq part number

Installing the SAN Switch 2/32

2

This chapter covers the following topics:

- [Unpack and Verify Carton Contents](#), page 20
- [Locating SAN Switch 2/32 Serial Numbers](#), page 23
- [Installation Guidelines](#), page 23
- [Setting Up the Switch as a Stand-alone Unit](#), page 25
- [Installing the Switch in a Rack Using the SAN Switch Rack Mount Kit](#), page 26
- [Connecting AC Power](#), page 38
- [Power On Self-Test](#), page 39
- [Configuring SAN Switch 2/32 Network Addressing](#), page 39
- [Connecting the SAN Switch 2/32 to the LAN](#), page 43
- [Core Switch PID Format Summary](#), page 44
- [Optional Configuration Settings](#), page 45
- [Connecting the SAN Switch 2/32 to the Fabric](#), page 46
- [Installing Multiple Switches into an Existing SAN](#), page 48
- [Recommendations for Cable Management](#), page 49

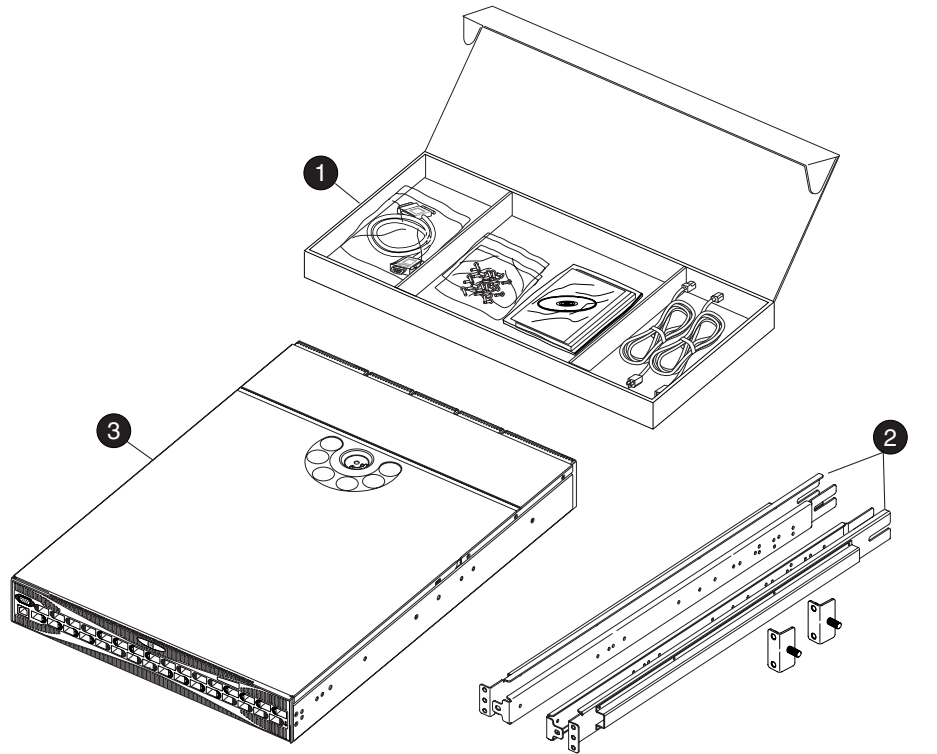
Unpack and Verify Carton Contents

Unpack and inspect the SAN Switch 2/32 carton contents as follows:

1. Inspect the shipping container for possible damage caused during transit.
2. Unpack the shipping cartons.
3. Verify that the carton contains the items shown in [Figure 3](#) and listed in [Table 3](#).

Note: If any items are damaged or missing, please contact HP or an HP authorized reseller.

Note: The Rack Mount Kit shown in [Figure 3](#) may not represent the kit that shipped with your switch. HP reserves the right to substitute Rack Mount Kits, providing applicable instructions with each switch.



SHR-2570B

Figure 3: Shipping carton contents

Table 3: Shipping Carton Contents

Number	Item
①	<p>One HP StorageWorks SAN Switch 2/32 product accessories box containing:</p> <ul style="list-style-type: none"> ■ One RS-232 Serial cable (convertible to an RJ-45 connector, by removing the adapter on the end of the cable) ■ Pouch containing rack mount hardware: <ul style="list-style-type: none"> — (14) #8-32 x 3/16-inch Phillips pan-head screw with thread lock for the SAN Switch 2/32 — (14) 8-32 x 5/16-inch Phillips pan-head SEMS screw for use with the SAN Switch 2/8, SAN Switch 2/8V, SAN Switch 2/16, SAN Switch 2/16V, and SAN Switch 2/16N <hr/> <p>Note: 8-32 x 5/16-inch Phillips pan-head SEMS screw graphic is not available for this release.</p> <hr/> <ul style="list-style-type: none"> — (10) #10-32 x 1/2-inch Phillips pan-head screw with captive star lock washer — (8) #10 alignment washer — (8) #10 adapter washer — (2) 1/4-20 hex nut with captive star lock washer — (2) 1/4-inch flat washer ■ Documentation, release notes, license, warranty, and CD ■ Two country-specific AC power cords ■ Two Power Distribution Unit (PDU) power cords (not shown in Figure 3) ■ Four rubber mounting feet for stand-alone installations on a table or lab bench
②	<p><u>SAN Switch Rack Mount Kit:</u></p> <ul style="list-style-type: none"> ■ Two rear mounting brackets ■ A right inner rail and a right outer rail ■ A left inner rail and a left outer rail
③	HP StorageWorks SAN Switch 2/32

Locating SAN Switch 2/32 Serial Numbers

Before contacting HP for technical support or service, obtain the three serial numbers located on the switch. Each serial number provides specific logistical information, identifying the device's manufacturing location.

Installation Guidelines

Read the following sections for installation guidelines. Install the SAN Switch 2/32 in one of the following ways:

- As a stand-alone unit on a flat surface. For instructions, see [Setting Up the Switch as a Stand-alone Unit](#), page 25.
- As a fixed component using the SAN Switch rack mount kit. For instructions, see [Installing the Switch in a Rack Using the SAN Switch Rack Mount Kit](#), page 26.

Selecting an Operating Location

To ensure correct operation of the switch, the location where the switch is to be used must meet the following requirements:

- Adequate supply circuit, line fusing, and wire size, as specified by the electrical rating on the switch nameplate.
- An air flow of at least 300 cubic feet per minute, available in the immediate vicinity of the switch.
- If you are installing the switch in the HP 9000 Series or comparable EIA rack:
 - All equipment installed in the rack should have a reliable branch circuit ground connection, and should not rely on a connection to a branch circuit, such as a power strip.
 - The rack should be balanced and the installed equipment should be within the rack's weight limits. Make sure the rack is mechanically secured to ensure stability in the event of an earthquake.

Cooling Requirements

Cooling air is drawn into the switch chassis by the fans mounted on the rear of the chassis. The air is expelled through vents in the front (port side) of the chassis, next to the HP logo. HP recommends installing the switch so that air intake and exhaust for all components in the rack is flowing in the same front-to-back direction.

Note: HP highly recommends mounting the switch in a cabinet or rack so that the fans reside in the front of the cabinet and the ports (cables) reside in the rear of the cabinet.

Follow these guidelines to ensure proper air flow and prevent component overheating:

- To ensure adequate cooling, install the switch with the non-port side, which contains the air intake vents, facing the cool-air aisle.
- Verify that a minimum of 47 cubic feet/minute (79.8 cubic meters/hour) of air flow is available to the air intake vents on the non-port side of the switch.
- Verify that the ambient air temperature does not exceed 40° Celsius (104° Fahrenheit) while the switch is operating.



Caution: Do not block air vents. The switch uses ambient air for cooling.

Power Requirements

Two AC power cords connect to the switch on either side of the rear panel. The AC power source must meet the following requirements:

- Primary AC Input 100–240 VAC (switch auto-senses input voltage) 47–63 Hz
- Correctly wired primary outlet, with circuit protected by a circuit breaker and grounded in accordance with local electrical codes
- Adequate supply circuit, line fusing, and wire size, as specified by the electrical rating on the switch nameplate
- Voltage capability of 85–264 VAC
- Input voltage frequency of 47–63 Hz
- Power capability of 75 watts maximum

The switch has a universal power supply capable of functioning worldwide without voltage jumpers or switches. The power supply is auto ranging in terms of accommodating input voltages and line frequencies.

Setting Up the Switch as a Stand-alone Unit

Use these procedures for setting up the switch as a stand-alone unit. The following items are required for this setup:

- SAN Switch 2/32
 - AC power cords and cables supplied with the switch
 - Rubber mounting feet supplied with the switch
1. Place the SAN Switch 2/32 on a flat, sturdy surface like a table or lab bench.
 2. Apply the rubber feet as follows:
 - a. Clean the four depressions that are at each corner of the bottom of the switch to ensure they are free of dust.
 - b. Place a rubber foot in each depression, with the adhesive side against the chassis, and press into place.



Caution: HP recommends installing the rubber feet on the switch to help prevent the switch from accidentally sliding off the table or bench.

3. Connect the power cables to the SAN Switch 2/32 power connectors and to a power outlet. Ensure the power cable is routed so that it is not exposed to stress.
4. Turn on the power to the switch (flip the AC switch to 1). The switch automatically runs a Power On Self-Test (POST).



Caution: Do not connect the switch to the network until the IP address is correctly set. For instructions on how to set the IP address, see [“Configuring SAN Switch 2/32 Network Addressing”](#) on page 39.

Installing the Switch in a Rack Using the SAN Switch Rack Mount Kit

This section provides instructions for installing the switch in an HP System/e cabinet, or in an HP 10000 series cabinet using the HP StorageWorks SAN Switch Rack Mount Kit supplied with your switch. The Rack Mount Kit installation requires one technician to install a SAN Switch.

The following items are required to install the switch in a cabinet:

- SAN Switch 2/32
- Power cables
- #2 Phillips screwdriver
- 7/16-inch wrench or socket

The SAN Switch Rack Mount Kit rails and rail mounting hardware listed in [Table 4](#).

Table 4: Rack Mount Kit rails and rail mounting hardware

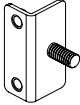
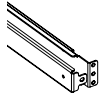
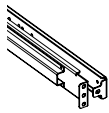
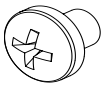
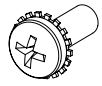




Item	Description
	(2) rear mounting brackets
	A right inner rail and a right outer rail
	A left inner rail and a left outer rail
	<p>(14) #8-32 x 3/16-inch Phillips pan-head screw with thread lock for the SAN Switch 2/32 only</p> <p>(14) 8-32 x 5/16-inch Phillips pan-head SEMS screw for use with the SAN Switch 2/32.</p> <hr/> <p>Note: 8-32 x 5/16-inch Phillips pan-head SEMS screw graphic is not available for this release.</p> <hr/>
	(10) #10-32 x 1/2-inch Phillips pan-head screw with captive star lock washer
	(8) #10 alignment washer

Table 4: Rack Mount Kit rails and rail mounting hardware (Continued)

Item	Description
	(8) #10 adapter washer
	(2) 1/4-20 hex nut with captive star lock washer
	(2) 1/4-inch flat washer



Caution: For proper air flow, the SFP media side of the SAN Switch 2/32 must face the rear of the rack. This mounting allows air to enter from the front of the rack and to exhaust at the rear of the rack, similar to other rack-mounted equipment. This prevents switch overheating, which may cause it to fail.

To install the switch in a rack:

1. Check the contents of the shipping carton to verify that all the required parts and hardware are available.
2. Choose a mounting location in the rack for the switch.
3. Attach the rear mounting brackets to the rear rack uprights by completing one of the following steps:
 - For an HP 10000 series or comparable EIA cabinet, assemble each of the two brackets with two #10-32 x 1/2-inch Phillips pan-head screws with captive star lock washers and two #10 adapter washers as shown in [Figure 4](#).

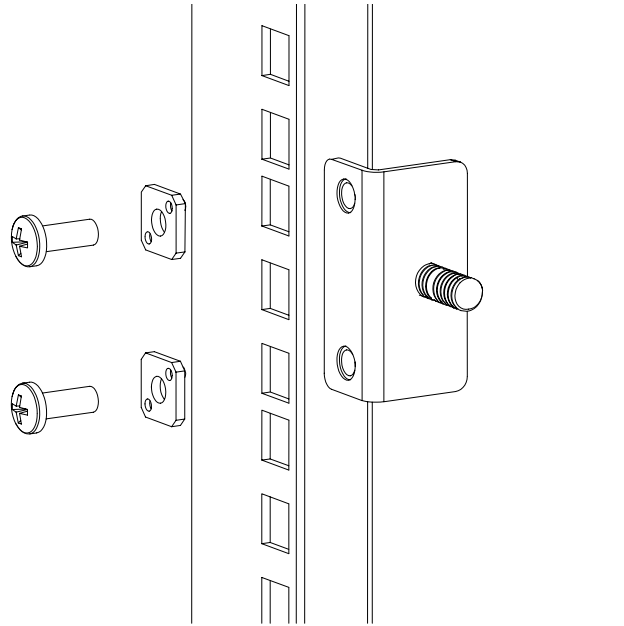


Figure 4: Installing the rear mounting brackets (HP 10000 series or comparable EIA cabinet)

- For an HP System/e rack, install each of the two rear mounting brackets with two #10-32 x 1/2-inch Phillips pan-head screws and two #10 alignment washers as shown in [Figure 5](#).

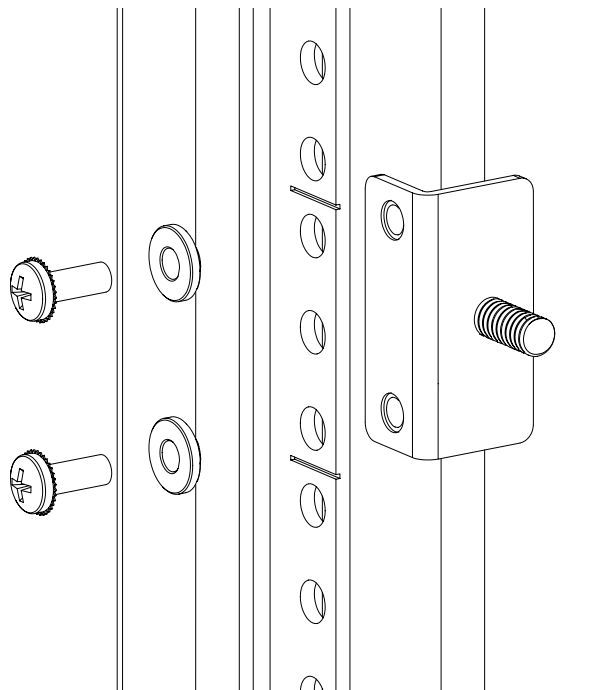


Figure 5: Installing the rear mounting brackets (HP System/e rack-left rear upright)

Note: This kit contains both left rails and right rails. The rails are marked *Right* and *Left*.

4. Assemble the outer rails by completing the following steps:
 - a. Attach the left outer rail and the right outer rails to the rear mounting brackets using two 1/4-20 hex nuts with captive star lock washers attached loosely as shown in [Figure 6](#). Do not tighten them; the nuts will be tightened later in [step 7](#) on page 37.

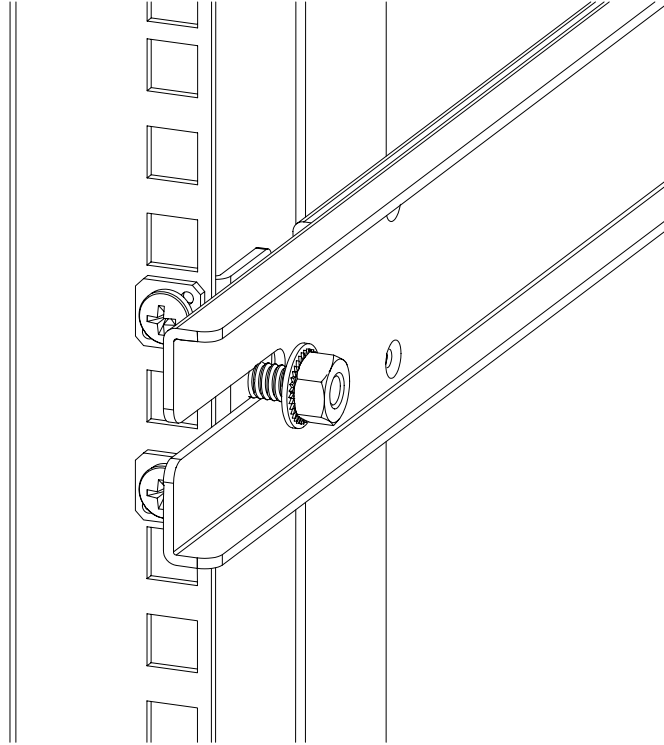


Figure 6: Installing the outer rails (HP 10000 series or comparable EIA cabinet)

- b. Depending on the rack you are using, complete one of the following tasks:
 - For an HP 10000 series or comparable EIA cabinet, install two #10-32 x 1/2-inch Phillips pan-head screws with captive star lock washers and two #10 adapter washers in the upper and lower hole locations of the right rail. Then install two #10-32 x 1/2-inch Phillips pan-head screws with captive star lock washers and two #10 adapter washers in the upper and lower hole locations of the left rail. See [Figure 7](#).

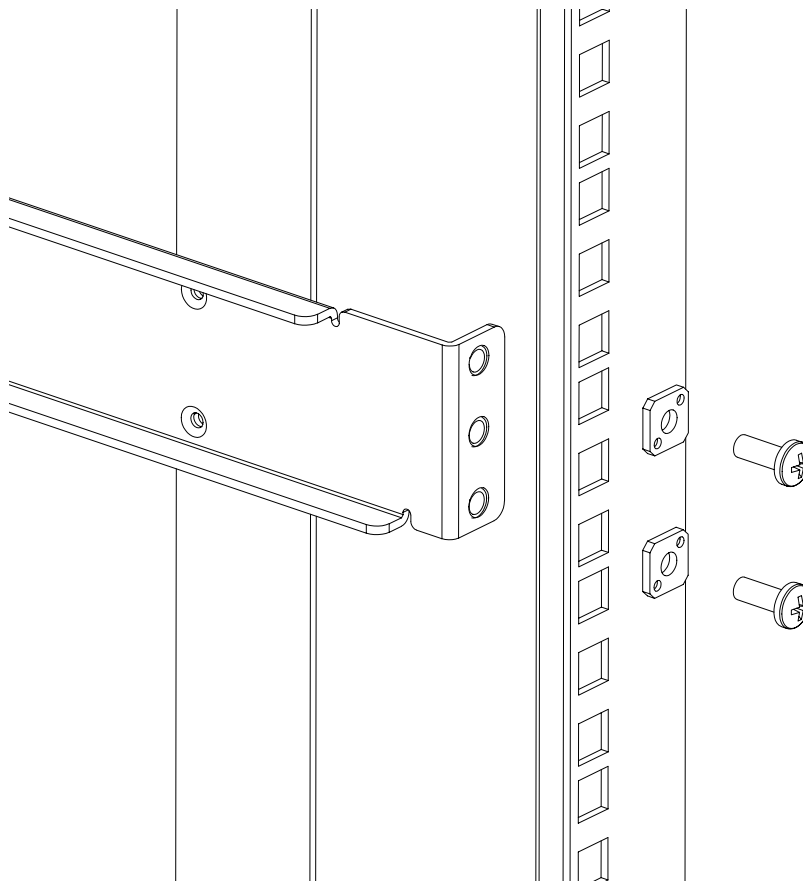


Figure 7: Assembling the outer rails (HP 10000 series or comparable EIA cabinet)

- For an HP System/e cabinet, install two #10-32 x 1/2-inch Phillips pan-head screws with captive star lock washers and two #10 alignment washers in the upper and lower hole locations of the right rail. Then install two #10-32 x 1/2-inch Phillips pan-head screws with captive star lock washers and two #10 alignment washers in the upper and lower hole locations of the left rail. See [Figure 8](#).

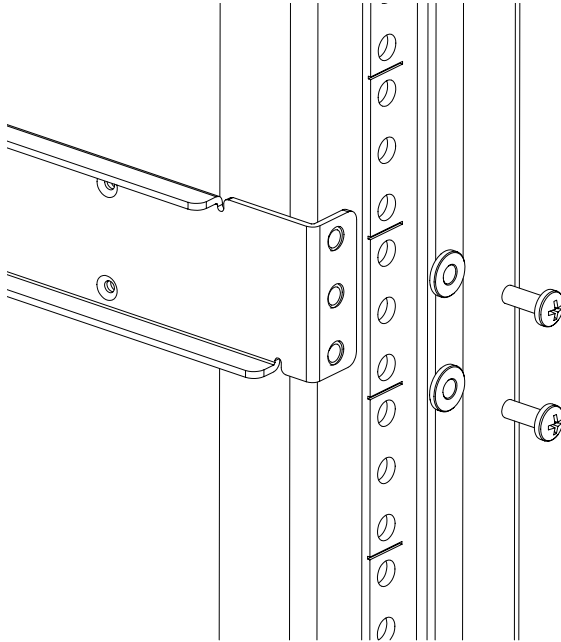


Figure 8: Assembling the outer rails (HP System/e cabinet)



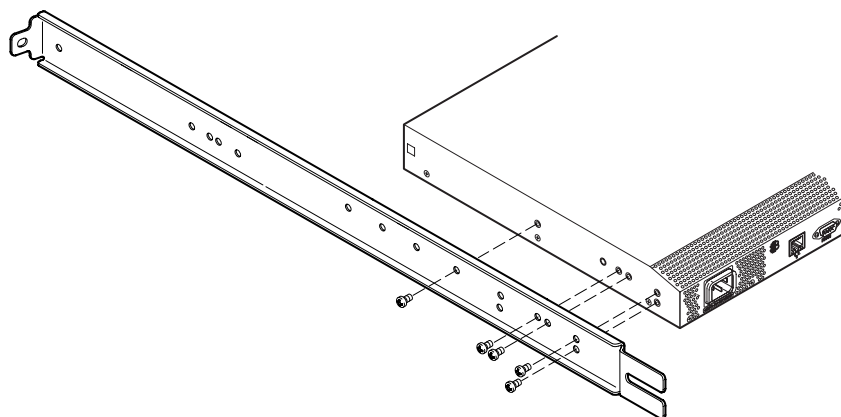
Caution: Do not use any screws other than the fourteen that are provided. Use of any longer screws can cause damage to internal components.

Note: The mounting holes in the inner rails are marked with 32, 16, and 8. When mounting the SAN Switch 2/32, use the mounting holes labelled 32 when installing the inner rails on the switch.

When viewing a rack from the front, the left rails are used in the left side of the rack and the right rails are used in the right side of the rack. The rails must match up—right inner with right outer and left inner with left outer. Note that the SAN Switch mounts in the rack with its front, the port side, facing the back of the rack. The rear of the switch, the AC side, faces the front of the rack.

5. Assemble the two inner rails (one on each side) to the switch using the ten #8-32 x 3/16-inch Phillips pan-head screws with thread lock as shown in [Figure 9](#).

Note: The rail kit provides fourteen #8-32 x 3/16-inch screws for assembling the inner rails. Each switch requires a different number of these screws. For example, [Figure 9](#) shows an inner rail being attached to the SAN Switch 2/32 with five screws. Attaching both inner rails requires ten screws.

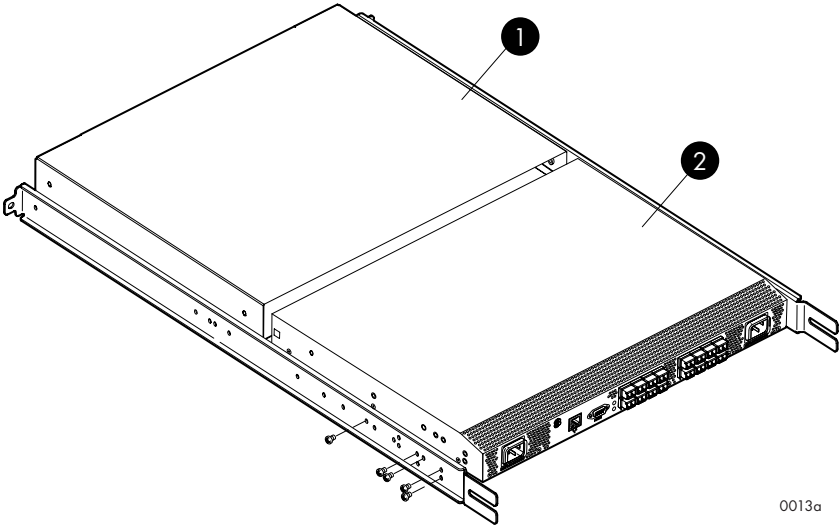


0012a

Figure 9: Assembling the inner rails

Note: For factory integration only, tighten the #8-32 x 3/16-inch Phillips pan-head screw with thread lock and torque between 6 to 8 inch-pounds.

Note: The plenum is a required part of this installation when the SAN switch 2/32 is installed in an HP 9000 or 10000 series, System/e or comparable EIA cabinet. The plenum allows air to dissipate at the rear of the rack, preventing overheating.



0013a

Figure 10: Assembling the inner rails on a SAN Switch with plenum

The components in [Figure 10](#) include:

❶	Plenum
❷	Switch

6. Insert the switch with the attached inner rails into the outer rails.

Note: This step applies to both the HP 10000 series, System/e cabinet or comparable EIA cabinets.

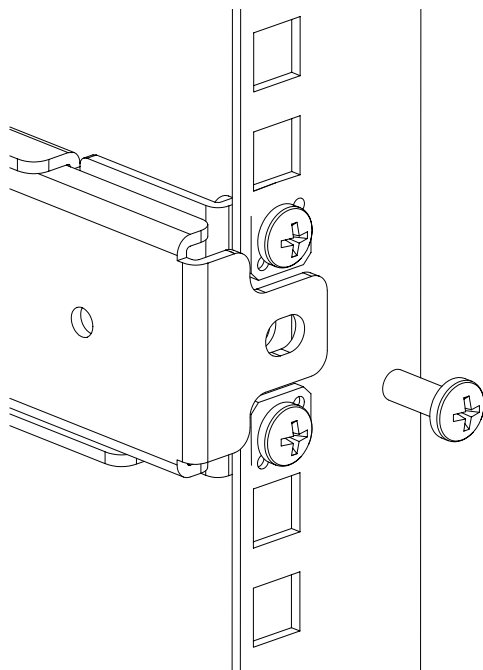


Figure 11: Installing the switch into a rack (HP 10000 series or comparable EIA cabinet)

Insert the switch into the rack and install two #10-32 x 1/2-inch Phillips pan-head screws with captive star lock washers, one on each side. See [Figure 11](#) and [Figure 12](#).

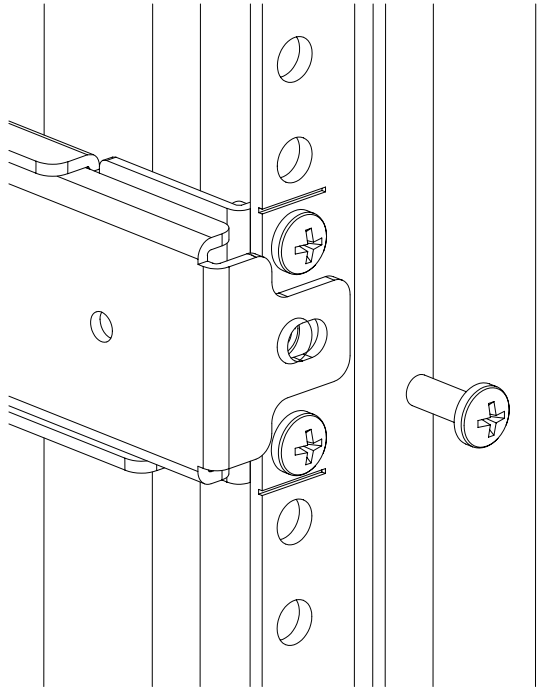


Figure 12: Installing the switch into a rack (HP System/e cabinet)

7. Tighten the nuts installed in [substep a](#) of [step 4](#) on page 30. See [Figure 6](#) on page 31.

Note: To uninstall a switch, remove the middle #10-32 x 1/2-inch Phillips pan head screw with captive star lock washer from either side of the rack uprights.

Connecting AC Power

Follow these steps to power on the SAN Switch 2/32.



Caution: Do not plug the power cords into the power source until the switch is completely installed in the rack.

1. Connect the SAN Switch 2/32 power cords to the power connectors on the switch as shown in [Figure 13](#).

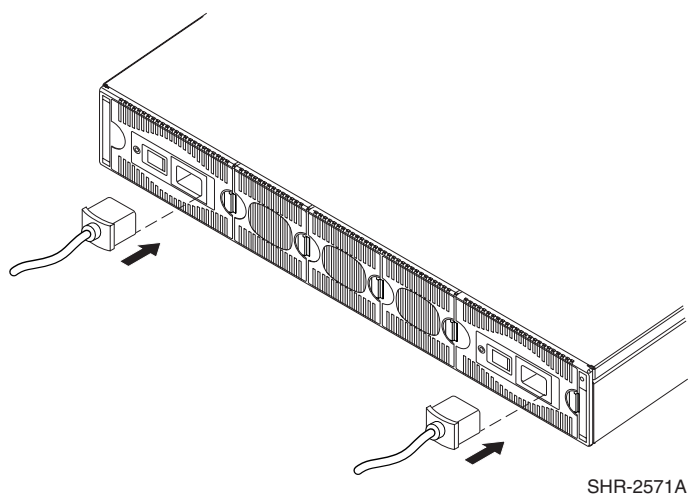


Figure 13: Connecting the power cords

2. Attach the remaining ends of the power cords to power outlets.
3. Turn on the power switch (the 1 position indicates power on, the 0 position indicates power off). The switch automatically runs POST.



WARNING: Do not connect the switch to the network until the IP address is correctly set. For instructions on setting the IP address, see "[Configuring SAN Switch 2/32 Network Addressing](#)" on page 39.

Power On Self-Test

Each time the switch is powered on, rebooted, or reset, it automatically runs POST. During POST, the port status LEDs flash, verifying that the switch is operating properly. POST completes in approximately six minutes, with total boot time approximately seven minutes.

POST runs through the following test cycles:

- Preliminary POST diagnostics
- Initialization of operating system
- Initialization of hardware
- Diagnostic tests, which are run on a number of functions, including circuitry, port functionality, memory, parity, statistics counters, and serialization

If the switch prompt does not display when POST completes, POST is unsuccessful. Contact your authorized HP switch supplier for more information.

To determine whether POST completed without errors, verify that all LEDs return to a normal state after POST is complete. If one or more LEDs do not return to a normal state (and this is not due to the switch being set to beacon), see [“Interpreting LED Activity”](#) in Chapter 3.

Note: For more information about beaconing, refer to the *HP StorageWorks Fabric OS 4.2.x Procedures User Guide*.

Checking POST Results

Check the success/fail results of the diagnostic tests run during POST via LED activity, the error log, or CLI using the `errShow` command. For more information about error messages, refer to the *HP StorageWorks Diagnostic and System Error Messages 4.2.x Reference Guide*.

Configuring SAN Switch 2/32 Network Addressing

This section contains information on how to configure the SAN Switch 2/32 addressing scheme.

For instructions about configuring the switch to operate in a fabric containing switches from other vendors, refer to the *HP StorageWorks Fabric OS 4.2.x Procedures User Guide*.

For detailed information about the commands used in this procedure, refer to the *HP StorageWorks Fabric OS 4.2.x Command Reference Guide*.

Requirements

The following items are required for configuring and connecting the SAN Switch 2/32 in a network and fabric:

- An unused IP address and corresponding subnetmask and gateway address from your Network Administrator
- SAN Switch 2/32 installed and connected to a power source
- A local workstation (desktop or notebook computer) with:
 - Microsoft® Windows 98, Windows 2000, Windows Millennium Edition, or Windows NT 4.0 operating system
 - RS-232 Serial communication software (for example, ProComm Plus or HyperTerminal)
- Serial cable provided with the switch
- Ethernet cable
- SFP transceivers and compatible cables, as required
- Access to an FTP server for backing up the switch configuration

Setting Network Addresses via a Serial Connection

Use the following steps to verify or change the SAN Switch 2/32 IP address, subnetmask, or gateway address.

Note: During first time setup, you must replace the factory IP, subnetmask, and gateway addresses with addresses provided by your Network Administrator.

1. Remove the shipping plug from the SAN Switch 2/32 serial port.
2. Connect the Serial cable to the SAN Switch 2/32 serial port as shown in [Figure 14](#).

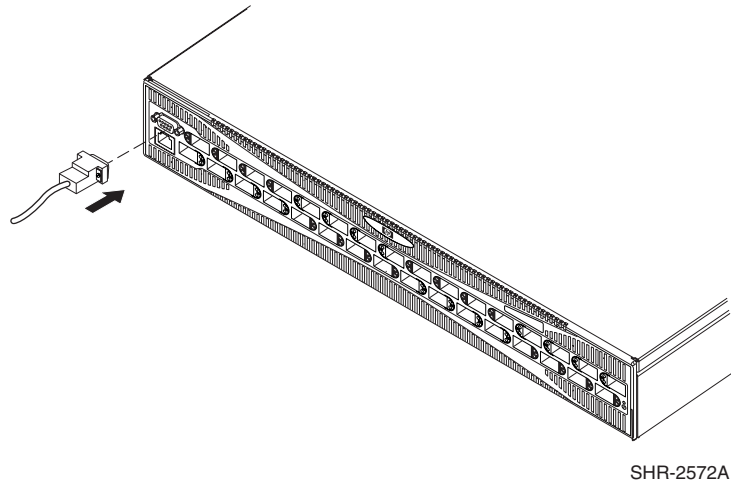


Figure 14: Connecting the Serial cable

3. Connect the other end of the serial cable to an RS-232 serial port on the workstation. If no RS-232 serial port is available on the workstation, the adapter on the end of the serial cable can be removed to use the RJ-45 connector to create a serial connection.
4. Verify that the switch power is on and POST is completed. See the “[Power On Self-Test](#)” section, earlier in this chapter.
5. Power on the workstation and establish a connection to the switch using a terminal emulator application (such as HyperTerminal).

Note: These steps show instructions specific to HyperTerminal. If you are using a different application, consult that application’s documentation.

6. Using HyperTerminal (or similar application), configure the port settings as follows:
 - Bits per second: 9600
 - Databits: 8
 - Parity: None
 - Stop bits: 1

■ Flow control: None

To configure port settings in a UNIX® environment, enter:

```
tip /dev/ttyb -9600
```

7. Log in to the switch as the admin user. The default admin logon is admin and the default password is password.
 - a. Issue the ipAddrSet command at the prompt.
 - b. Enter the following information at the corresponding prompts, as shown in the example below:

Example

```
switch:admin> ipaddrset
Ethernet IP Address [10.77.77.77]:10.32.53.47
Ethernet Subnetmask [255.0.0.0]:255.255.240.0
Fibre Channel IP Address [0.0.0.0]:
Fibre Channel Subnetmask [0.0.0.0]:
Gateway IP Address [0.0.0.0]:10.32.48.1
Set IP address now? [y = set now, n = next
reboot]:y
IP address being changed...
Committing configuration...Done.
switch:admin>
```

- c. To verify that the IP address was entered correctly, issue the ipAddrShow command.
 - d. After the IP address is verified as correct, remove the serial cable, and replace the shipping plug in the serial port.



Caution: The serial port is intended for use only during the initial setting of the IP address and for service purposes. HP does not recommend using the serial port during normal switch operation or for regular maintenance.

8. Record the IP address on the label affixed to the SAN Switch 2/32.

Connecting the SAN Switch 2/32 to the LAN

Use the following steps to connect the SAN Switch 2/32 to the Ethernet Local Area Network (LAN) segment.

1. Remove the shipping plug from the SAN Switch 2/32 Ethernet port.
2. Connect one end of an Ethernet cable to the SAN Switch 2/32 Ethernet port as shown in [Figure 15](#).

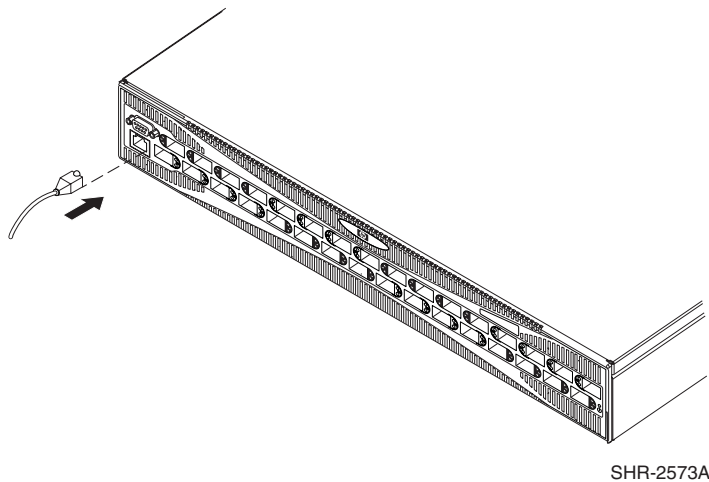


Figure 15: Connecting the Ethernet cable

3. Connect the other end of the Ethernet cable to the workstation or to an Ethernet network containing the workstation.

Note: You can now access the switch remotely (and from multiple connections), using Telnet or the Advanced Web Tools application. Verify that the switch is not accessed from any other connections during the remaining steps.

4. Log in to the switch by Telnet as the admin user. The default admin logon is `admin` and the default password is `password`.

Core Switch PID Format Summary

A Core PID format is one of several addressing formats used in Fibre Channel. The parameter is used by the routing and zoning services in Fibre Channel fabrics to identify ports in the network.

The PID format is analogous to specifying the physical switch and port a device is attached to in data networks. It is not analogous to an IP address. PIDs are assigned by a Fibre Channel switch when a device logs into the fabric.

A sample PID looks like this: 011F00

Many scenarios cause a device to receive a new PID. For example, it can be caused by unplugging the device from one port and plugging it into a different port. (This might occur when cabling around a bad port or when moving equipment around.) Another example is changing the domain ID of a switch, which might be necessary when merging fabrics, or changing compatibility mode settings.

Note: All switches running Fabric OS version 4.0.x or later are shipped with the Core Switch PID Format enabled, so it is not necessary to change the Core Switch PID format on these switches. For example, the HP StorageWorks SAN Switch 2/32 and HP StorageWorks Core Switch 2/64 always use Core Switch PID format 1. This parameter is always 1 and cannot be changed.

Mixed Fabric Environment with Different Switch Platforms

Fabric OS v2.6.2, v3.1.2, and v4.2.x introduced a new switch PID format: Extended Edge PID (format 2). Extended Edge PID is useful if you introduce a Fabric OS 4.2.x switch into a fabric that consists solely of Fabric OS v2.x/3.x switches. Before adding a Fabric OS 4.2.x switch to such a fabric, refer to the *HP StorageWorks Fabric OS 4.2.x Procedures User Guide* for information on the Extended Edge PID format.

Note: Switches must operate with Fabric OS v2.6.2, v3.1.2, and v4.2.x to use the Extended Edge PID format.

If Extended Edge PID is set (before a downgrade from the current Fabric OS release to an earlier Fabric OS release that does not support the Extended PID format), PID needs to be set back to a supported format, such as Core PID (format 1) or native PID (format 0).

Optional Configuration Settings

This section describes how to modify domain IDs and status policies.

Modifying Domain IDs

Optional. Modify the domain IDs, if desired, as follows.

Note: The default domain ID is 1. If the default domain ID is already in use when the switch is connected to the fabric, the domain ID for the new switch is automatically reset to a unique value. The domain IDs that are currently in use can be determined using the Telnet command `fabricShow`.

1. Disable the switch by issuing the `switchDisable` command.
2. Issue the `configure` command.
3. Enter `y` at the Fabric parameters prompt:
`Fabric parameters (y, n)`
4. Enter a unique domain ID (such as the domain ID used by the previous switch, if still available):
`Domain: (1..239) [1] 3`
5. Complete the remaining prompts (or press **CTRL+D** to accept the remaining settings without completing all the prompts).
6. Reenable the switch by issuing the `switchEnable` command.

Specifying Custom Status Policies

Optional. If desired, specify any custom status policies for the fabric as follows.

1. Issue the `switchStatusPolicySet` command.
2. Specify the desired status policies. To completely deactivate the alarm for a particular condition, enter 0 at the prompt for that condition.

Note: Configure each port to match the topology of each host or target before connecting to the device. The default port configuration is fabric, not private loop. The switch does not auto-sense topology.

Connecting the SAN Switch 2/32 to the Fabric

Execute the following procedure to connect the SFPs and cables to SAN Switch 2/32 ports as required.

Note: The ports and cables used in trunking groups must meet specific requirements. For a list of these requirements, refer to the *HP StorageWorks Fabric OS 4.2.x Features Guide*.

1. Remove the shipping plug from the appropriate ports.
2. Position the SFP so that the key (the tab near the cable-end of the SFP) is on top.
3. Insert the SFP into the port until it is firmly seated and the latching mechanism clicks.

Note: The SFP is keyed so that it can be inserted only with the correct orientation into the port. If the SFP does not slide in easily, check the orientation.

4. Connect the cables to the SFPs as appropriate to the fabric topology by positioning each cable so that the key (the ridge on one side of the cable connector) is aligned with the slot in the SFP. See [Figure 16](#).

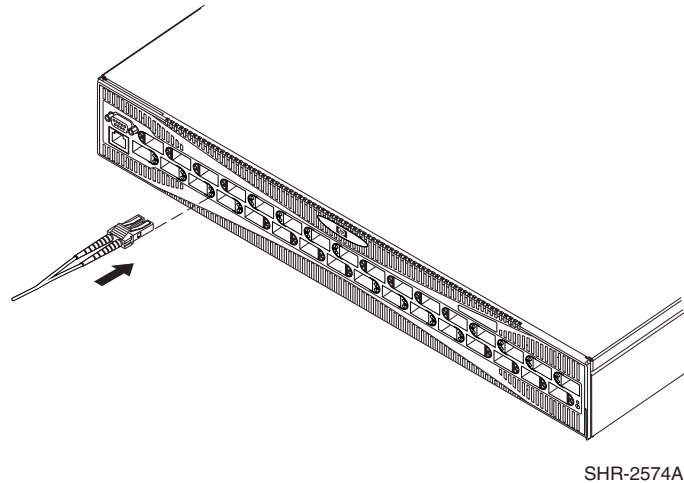


Figure 16: Inserting a cable into an SFP

Note: The cable is keyed so that it can only be inserted correctly into the SFP. If the cable does not slide in easily, check the orientation.

Verifying Operation

After making the appropriate connections, as outlined in this chapter, follow these steps to verify that the switch is running properly.

1. Access your browser.
2. At the URL address window, enter <http://your switch IP address>.
3. If connected properly, the name of your switch appears in green at the prompt, indicating `Healthy/OK`.

Note: HP strongly recommends that you back up the configuration. This ensures that a complete configuration is available if required for a replacement switch. For instructions on how to back up the configuration, refer to Chapter 4, “Backing Up Configuration Data and Upgrading Firmware.” Or, for more detailed information and commands, refer to the *HP StorageWorks Fabric OS 4.2.x Procedures User Guide*.

Installing Multiple Switches into an Existing SAN

Execute this procedure to set up more than one SAN Switch 2/32 in an existing SAN.

1. Connect the appropriate components as outlined in the installation section of this chapter.
2. Connect the power cord to the AC connector on the switch. The switch performs POST.
 - If a malfunction occurs during POST, error messages are written to the switch error log and can be viewed by a Telnet or terminal session when the POST session completes.
 - If the malfunction prohibits the switch from completing the boot process (a fatal error), the switch stops the boot process. If the switch does not fully boot, the switch prompt is not displayed when the serial port is connected.
3. Connect the serial cable (provided in the package contents) between a host computer and the serial port of the switch. See “[Setting Network Addresses via a Serial Connection](#),” on page 40, to make a serial connection through a workstation and to set the IP address.
4. Issue the `configure` command to set the switch Domain Address to the next unused domain in the SAN. The default domain setting is 1.

Note: If a switch boot failure occurs, the switch must be taken offline for repair or replacement. Contact your HP Technical Support for assistance.

5. Power off the new switch and connect one Fibre Channel cable from the SAN to the new switch.

Recommendations for Cable Management

HP recommends following these cable management guidelines:

- Plan cable management before installing the switch in a rack.
- Leave at least one meter of slack for each port cable (this provides room to remove and replace the switch).
- If you are using ISL Trunking:
 - Group cables by trunking groups.
 - The cables used in trunking groups must meet specific requirements. For a list of these requirements, refer to the *HP StorageWorks Fabric OS 4.2.x Features User Guide*.
- Label the fiber optic cables and record the devices to which they are connected.
- Keep LEDs visible by routing port cables and other cables directly downwards or otherwise away from the LEDs.
- Do not use tie wraps on fiber optic cables; they are easily overtightened and can damage the optic fibers.

Note: The minimum bend radius for a 50-micron cable is 2 inches under full tensile load, and 1.2 inches with no tensile load.

Managing the SAN Switch 2/32

3

This chapter discusses the following topics:

- [Interpreting LED Activity](#), page 52
- [Management Overview](#), page 58
- [Running Basic Switch Operations Using Telnet](#), page 60
- [SAN Switch 2/32 Diagnostics](#), page 63
- [Field Replaceable Units](#), page 64

Interpreting LED Activity

SAN Switch 2/32 status is determined through the LED activity on the switch. There are three possible LED states: no light, a steady light, and a flashing light. The lights may be any of the following colors:

- Green
- Orange (may be referred to as *amber* in related documentation)
- Yellow (appears when both green and orange LED elements are lit)

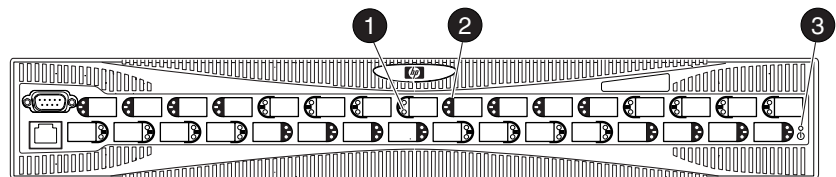
Note: Any errors related to LED activity are listed in the error log. For information about the error log, refer to the *HP StorageWorks Fabric OS 4.2.x Procedures User Guide*.

LEDs on the Port Side of the Switch

The port side of the switch contains the following LEDs; see [Figure 17](#):

- One Switch Power/Status LED on right side
- One Port Status LED next to each Fibre Channel port (lower LED)
- One Port Speed LED next to each Fibre Channel port (upper LED)

Note: The port LEDs for the upper ports (ports 16–31) are to the left of the ports. The Port LEDs for the lower ports (ports 0–15) are to the right of the ports.



SHR-2578A

- | | |
|--------------------------------|--------------|
| ❶ Port status LEDs (lower LED) | ❸ Status LED |
| ❷ Port speed LEDs (upper LED) | |

Figure 17: LEDs on port side of SAN Switch 2/32

Table 5 describes the LEDs on the port side of the switch.

Table 5: Front Panel LED Patterns During Normal Operation

LED Name and Location	LED Location	Color Display	Hardware Status	Recommended Action
Switch Power/Status LED	On far right when viewing switch from port side	No light	Switch is off, or boot is not complete, or boot failed.	Verify switch is on and has completed booting.
		Steady green		No action required.
		Flashing green	One or both of the following are true: <ul style="list-style-type: none"> ■ One or more environmental ranges are exceeded. ■ Error log contains one or more port diagnostic error messages. 	<ol style="list-style-type: none"> 1. Check environmental conditions, error log, Port Status LEDs, transceivers, cables, and loopback plugs. 2. Correct error condition. 3. Clear error log. 4. Rerun diagnostics to verify fix.
Port Status LED	Lower LED next to each port	No light	No signal detected.	Check transceiver and cable.
		Steady green	Port is online (connected to external device) but has no traffic.	No action required.

Table 5: Front Panel LED Patterns During Normal Operation (Continued)

LED Name and Location	LED Location	Color Display	Hardware Status	Recommended Action
Port Status LED	Location	Slow flashing green	Port is online but segmented, indicating a loopback cable or incompatible switch.	Verify correct device is connected to port, and switch and port settings are correct.
		Fast-flashing green	Port is in internal loopback (diagnostic).	No action required.
		Flickering green	Port is online, with traffic flowing through port.	No action required.
		Flashing or steady yellow	POST is running.	No action required.
		Steady orange	Port is receiving light or signal carrier, but is not yet online.	No action required.
		Slow flashing orange	The port is disabled (result of diagnostics or <code>portDisable</code> command).	Reset the switch from a management station.
		Fast-flashing orange	The port is faulty.	1. Check transceiver and cable or loopback plugs for correct insertion. 2. Check and clear error log.

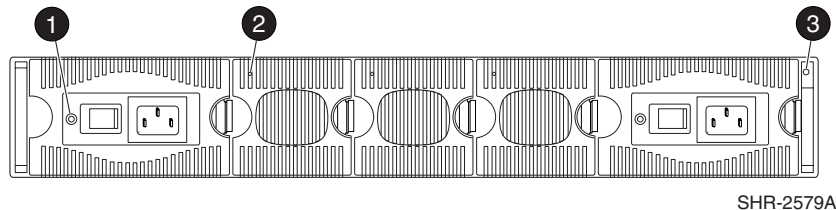
Table 5: Front Panel LED Patterns During Normal Operation (Continued)

LED Name and Location	LED Location	Color Display	Hardware Status	Recommended Action
Port Status LED (continued)		Alternating green and orange	Port is bypassed.	Reset the port from a management station or check configuration of the Fibre Channel loop.
Port Speed LED	Above each port, on right	No light	The port is transmitting or receiving at 1 Gbps.	No action required.
		Steady green	The port is transmitting or receiving at 2 Gbps.	No action required.

LEDs on the Non-Port Side of the SAN Switch 2/32

The non-port side of the switch contains the following LEDs, see [Figure 18](#):

- One Port Readiness LED on right side
- One Power Supply LED next to the AC power switch on each power supply
- One Fan Failure LED at the top of each fan assembly (inside the bezel)



- ❶ Power supply LED
- ❷ Fan failure LED
- ❸ Port readiness LED

Figure 18: LEDs on non-port side of SAN Switch 2/32

[Table 6](#) describes the LEDs on the non-port side of the switch.

Table 6: Non-Port Side LED Patterns During Normal Operation

LED Name and Location	LED Location	Color Display	Hardware Status	Recommended Action
Port Readiness LED	On far right when viewing switch from non-port side	No light	Switch is off, or boot is not complete, or boot failed.	Verify switch is on and has completed booting.
		Steady green	Switch is on and all ports are ready for use.	No action required.
		Steady yellow	One or more ports are offline.	Verify switch has completed booting and is not disabled. If light is still yellow, check error log and Port Status LEDs.
		Slow-flashing yellow (on 1 second; off 1 second)	One or both of the following are true: One or more environmental ranges are exceeded. Error log contains one or more port diagnostic error messages.	<ol style="list-style-type: none"> 1. Check environmental conditions, error log, Port Status LEDs, transceivers, cables, and loopback plugs. 2. Correct error condition. 3. Clear error log. 4. Rerun diagnostics to verify fix.
Power Supply LED	On each power supply (left corner)	No light	Power supply is not providing power.	Verify power supply is on and seated, and power cord is connected to a functioning power source.

Table 6: Non-Port Side LED Patterns During Normal Operation (Continued)

LED Name and Location	LED Location	Color Display	Hardware Status	Recommended Action
		Steady green	Power supply is providing power.	No action required.
Fan Failure LED	On each fan assembly (left corner)	No light	Fan assembly is either healthy or is not receiving power.	Verify power supply is on and power cord is connected to a functioning power source.
		Flashing orange (on 1 second; off 1 second)	Fan assembly has failed.	Replace fan assembly.

Management Overview

You can use the management functions built into the SAN Switch 2/32 to monitor the fabric topology, port status, physical status, and other information to aid in performance analysis and system debugging.

You can manage the switch using any of the management options listed in [Table 7](#).

Note: For information about upgrading the version of Fabric OS installed on the switch, refer to the *HP StorageWorks Fabric OS 4.2.x Procedures User Guide*.

Table 7: Management Options for the SAN Switch 2/32

Management Tool	Out-of-band Support	In-band Support
Command Line Interface (CLI) Runs up to two admin sessions and four user sessions simultaneously. Refer to the <i>HP StorageWorks Fabric OS 4.2.x Procedures User Guide</i> .	Ethernet or Serial connection	IP over Fibre Channel *
Fabric Manager (option) Refer to the <i>HP StorageWorks Fabric Manager 4.1.1 User Guide</i> .	Ethernet	IP over Fibre Channel *
Advanced Web Tools Refer to the <i>HP StorageWorks Advanced Web Tools 4.2.x User Guide</i> .	Ethernet or Serial connection	IP over Fibre Channel *
Standard SNMP applications Refer to the <i>HP StorageWorks Management Information Base 4.2.x Reference Guide</i> .	Ethernet or Serial connection	IP over Fibre Channel *

Table 7: Management Options for the SAN Switch 2/32 (Continued)

Management Tool	Out-of-band Support	In-band Support
Management server Refer to the <i>HP StorageWorks Fabric OS 4.2.x Procedures User Guide</i> and the <i>HP StorageWorks Fabric OS 4.2.x Command Reference Guide</i> .	Ethernet or Serial connection	Native inband interface (over HBA only)

* Requirements for running IP over Fibre Channel:

- Must be run on both HBA and switch.
- Must be supported by both HBA and HBA driver.

Note: The HP StorageWorks SAN Switch 2/32 includes a different set of integrated features, depending upon the model purchased. Refer to the *HP StorageWorks Fabric OS 4.2.x Release Notes* for a complete list of supported features.

Optional Management Feature – Fabric Manager

Fabric Manager provides a GUI that allows the administrator to monitor and manage an entire fabric from a standard workstation. Use Fabric Manager to manage fabrics containing integrated fabrics, in addition to individual switches. Contact your HP authorized reseller for purchasing information.

Displaying the Optional Feature Licenses

Follow these steps to display optional features installed on your switch.

1. Log in to the switch as the admin user.
2. Issue the `licenseShow` command.

This command displays the license keys that have been entered for the switch and the features enabled by those licenses.

Running Basic Switch Operations Using Telnet

This section shows how to run common switch operations via Telnet.

Logging into the SAN Switch 2/32

Follow these steps to log in to the SAN Switch 2/32:

1. Open a Telnet connection to the switch. The login prompt is displayed if the Telnet connection successfully found the switch in the network.

Note: The switch must be connected to your IP network through the RS-232 port to enable connection through Telnet.

2. At the login prompt, enter the user ID you are logging in as. For example:

```
login: admin
```

The password prompt is displayed if the user exists.

3. Enter the password for the user:

```
password: xxxxxx
```

The default password is password.

4. If the login is successful, a prompt is displayed showing the switch name and user ID you are logged in as. For example:

```
switch55>admin:
```

Changing the Admin Password and User ID

Use these steps to change the admin user ID and password. For security reasons, the first time you log in to the Fabric OS, you are requested to change the admin user ID and system password.

Note: Previous switches did not require a password to access the management via the serial line. With version 4.0.0 and later, a password is required to use the serial line, similar to using the admin level Telnet or admin level Web Tools.

1. Log in to the switch as the admin user.

2. At the command line, enter the following command:
`Password admin`
An interactive session is opened and you are prompted for configuration values.
3. At the `New username` prompt, enter a new name for the admin user. You can change the name of the admin user without changing the password. Press **Enter** to leave the name as is.
4. At the `Old Password` prompt, enter the old password.
5. At the `New password` prompt, enter the new password. The new password must be from 8 to 40 characters.
6. At the `New password` prompt, enter the new password exactly as entered to the previous prompt.
7. Press **Enter** to commit the configuration to the firmware.

Note: Save your passwords in a safe place. It is nearly impossible to access a switch without knowing the switch password.

Configuring the IP and Fibre Channel Address

The SAN Switch 2/32 is shipped with a default IP address of 10.77.77.77. Follow these steps to change the default IP Address and configure the Fibre Channel IP address of the switch.

1. Log in to the switch as the admin user.
2. Issue the `ipAddrSet` command.
An interactive session is opened and you are prompted for configuration values. Press **Enter** to skip a prompt and leave the parameter value as is.
3. At the `Ethernet IP Address` prompt, enter the new IP address for the Ethernet port on the switch. Press **Enter**.
4. At the `Ethernet Subnetmask` prompt, enter the address of the subnetmask, if applicable. Press **Enter**.
5. At the `Fibre Channel IP address` prompt, enter the Fibre Channel IP address for the switch. Press **Enter**.
6. At the `Fibre Channel Subnetmask` prompt, enter the address of the subnetmask, if applicable. Press **Enter**.

7. At the `Gateway Address` prompt, enter the IP address of the gateway system if applicable. Press **Enter**.

The configuration is then committed to the switch firmware.

8. You are prompted either to make the IP address changes active now or at the next reboot. Enter `y` at the prompt to have the IP address changes take effect immediately.

Displaying Devices within the Fabric

To verify that you have fabric-wide connectivity when you install a new switch, display the fabric-wide device count from the newly installed switch. Use these steps to display the fabric.

1. Log in to the switch as the admin user.
2. Issue the `nsAllShow` command.

This command displays all the connected devices in the fabric.

Checking the Firmware Version

Follow these steps to display the SAN Switch 2/32 firmware version.

1. Log in to the switch as the admin user.
2. Issue the `version` command.

This command displays the Kernel version and Fabric OS release number.

Setting the Switch Date and Time

All switches maintain current date and time in non-volatile memory. Date and time are used for logging events. Switch operation does not depend on the date and time; a switch with an incorrect date and time value still functions properly.

Follow these steps to set the date and time of a switch.

1. Log in to the switch as the admin user.
2. At the command line, issue the following command:

```
date "MMDDhhmmYY"
```

where:

- MM is the month; valid values are 01–12.
- DD is the date; valid values are 01–31.

- hh is the hour; valid values are 00–23.
- mm is minutes; valid values are 00–59.
- YY is the year; valid values are 00–99.

Note: Year values greater than 69 are interpreted as 1970–1999; year values less than 70 are interpreted as 2000–2069. The date function does not support daylight saving time or time zones.

Displaying Switch Configuration Settings

Follow these steps to display the system configuration settings.

1. Log in to the switch as the admin user.
2. Issue the `configShow` command.

The system configuration settings display.

SAN Switch 2/32 Diagnostics

This section provides information on using POST and diagnostic tests.

Interpreting POST Results

Each time the switch is powered on or reset, the switch automatically performs POST, a one-minute system check during which the port status LEDs flash different colors.

To determine whether POST completed without errors, verify that all LEDs return to a normal state after POST is complete. If one or more LEDs do not return to a normal state, and this is not due to the switch being set to beacon, refer to the *HP StorageWorks Fabric OS 4.2.x Procedures User Guide*.

Note: If the switch prompt does not display when POST completes, POST did not successfully complete. The switch should be returned to your switch supplier for repair.

Any errors detected during POST are written to the system log, accessible through the `errShow` command. For more information about error messages, refer to the *HP StorageWorks Fabric OS 4.2.x Procedures User Guide*.

Additional Diagnostic Tests

The SAN Switch 2/32 uses diagnostic tests to help troubleshoot hardware and firmware. The diagnostic tests provided on the switch include tests of internal connections and circuitry, fixed media, and any SFP modules and fiber optic cables in use. The tests are implemented by command, either through a Telnet session or through a terminal set up for a serial connection to the switch. Some tests require the ports to be connected by external cables to allow diagnostics to verify the serializer/deserializer interface, and to verify the attached SFP and cable.

All diagnostic tests are run at link speeds of both 1 Gbps and 2 Gbps. For information about the specific diagnostic tests and how to run them, refer to the *HP StorageWorks Fabric OS 4.2.x Procedures User Guide*.

Note: The transmit and receive speed of the links may be temporarily locked to a specific speed during diagnostic testing.

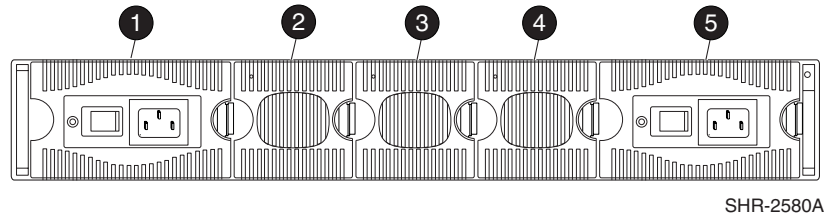
Field Replaceable Units

You can replace the power supplies, fan assemblies, and motherboard in the field without the use of special tools. The power supplies and fan assemblies are keyed to ensure correct orientation during installation. Replacement instructions are provided with all replacement units ordered.

Note: The SAN Switch 2/32 uses two AC power cords. To remove all power from the switch, disconnect both power cords before servicing.

Power Supplies

The two power supplies are hot-swappable if replaced one at a time. They are identical and fit into either power supply slot; see [Figure 19](#).



- | | |
|------------------------------------|------------------------------------|
| ❶ Power supply #2 | ❷ Fan assembly containing fans 5,6 |
| ❸ Fan assembly containing fans 3,4 | ❹ Fan assembly containing fans 1,2 |
| | ❺ Power supply #1 |

Figure 19: Power supplies and fan assemblies locations

The Fabric OS identifies the power supplies as follows, viewing the switch from the non-port side:

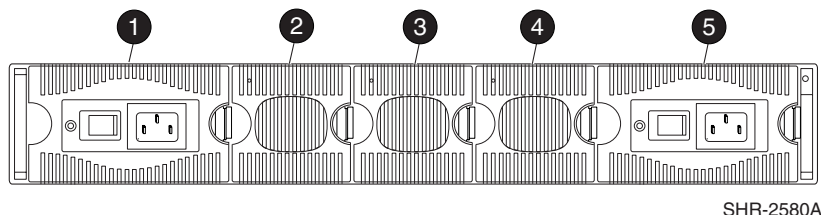
- Power supply #1 is on the right.
- Power supply #2 is on the left.

To determine whether a power supply requires replacing:

- Check the Power Supply LED next to the AC switch.
- Issue the `psshow` command.
- In Web Tools, click the Power Status icon.

Fan Assemblies

The three fan assemblies are hot-swappable if replaced one at a time. The fan assemblies are identical and fit into any fan assembly slot; see [Figure 20](#).



- | | |
|------------------------------------|------------------------------------|
| ❶ Power supply #2 | ❸ Fan assembly containing fans 3,4 |
| ❷ Fan assembly containing fans 5,6 | ❹ Fan assembly containing fans 1,2 |
| | ❺ Power supply #1 |

Figure 20: Power supplies and fan assemblies locations

Each fan assembly contains two fans, identified by Fabric OS as follows, viewing the switch from the non-port side:

- The fan assembly on the right contains fans #1 and #2.
- The fan assembly in the center contains fans #3 and #4.
- The fan assembly on the left contains fans #5 and #6.

Any of the following methods can be used to determine whether a fan assembly requires replacing:

- Check the Fan Failure LED on the face of the fan assembly.
- Issue the `fanshow` command.
- In Web Tools, click the Fan Status icon.

Motherboard Assembly

The switch must be powered off and removed from the fabric (and possibly from the cabinet) to replace the motherboard assembly. To determine whether the motherboard assembly requires replacing, first check the Switch Power/Status and Port Status LEDs. Next, run diagnostics (refer to the *HP StorageWorks Fabric OS 4.2.x Procedures User Guide*). If the motherboard assembly appears to require replacing, contact your switch supplier.

Backing Up the Configuration and Upgrading Firmware

4

This chapter discusses the following topics:

- [Backing Up System Configuration Settings](#), page 68
- [Restoring the System Configuration Settings](#), page 69
- [Upgrading or Restoring Switch Firmware](#), page 69
- [Downloading Firmware from the HP Website](#), page 70

Backing Up System Configuration Settings

HP strongly recommends saving the configuration after the initial configuration changes and periodically thereafter.

FTP must be used on Windows workstations to back up the system configuration. The FTP server must be running before an upload can occur. Use the RSHD service or FTP on a UNIX machine.

Note: The two supplied utilities, RSHD.EXE and CAT.EXE currently do not support uploads for Windows, only downloads. These utilities are available from the HP support web site: <http://www.hp.com/support/>

Execute these steps to upload a backup copy of the configuration settings to a host computer.

1. Verify that the RSHD service (on a UNIX machine) or the FTP service (on a Windows or UNIX machine) is running on the host workstation.
2. Log in to the switch as the admin user.
3. Issue the following command:

```
configUpload hostIPAddr, user, path_filename, password
```

Where *hostIPAddr* is the IP address of the host computer, *user* is the user ID used to log into this computer, *path_filename* is the path location and filename of the configuration file, and *password* is the password for the user ID specified.

If only `configupload` is entered, the system prompts you for each parameter, as follows:

```
switch:admin> configupload
Server Name or IP Address [host]: 123.45.678.901
User Name [user]: kelev
File Name [config.txt]: switch1
Protocol (RSHD or FTP) [rshd]: ftp
Password:
upload complete
```

Restoring the System Configuration Settings

Execute these steps to restore the system configuration settings from a backup.

1. Verify that the RSHD service or the FTP service is running on the host workstation.
2. Log in to the switch as the admin user.
3. Shut down the switch by issuing the `switchDisable` command.
4. At the command line, issue the following command:

```
configdownload hostIPaddr,user,path_filename,password
```

Where *hostIPaddr* is the IP address of the host computer, *user* is the user ID used to log into this computer, *path_filename* is the path location and filename of the configuration file, and *password* is the password for the user ID specified. The password operand is required only if you are using FTP.

5. To reboot the switch, issue the `fastBoot` command.

Upgrading or Restoring Switch Firmware

The SAN Switch 2/32 ships with preloaded firmware. In most cases there is no need to update the firmware on the new switch. The firmware version can be determined by using either of the following:

- The `version` Telnet command
- The Switch Management Application page in Web Tools

Execute these steps to upgrade or restore the switch firmware.

1. Verify that the RSHD service or the FTP service is running on the host workstation.
2. Log in to the switch as the admin user.
3. Issue the following command:

```
firmwareDownload hostIPaddr,user,path_filename,password
```

Where *hostIPaddr* is the IP address of the host computer, *user* is the user ID used to log into this computer, *path_filename* is the path location and filename of the new firmware file, and *password* is the password for the user ID specified. The password operand is required only if you are using FTP.

4. Reboot the switch by issuing the `fastBoot` command.

Downloading Firmware from the HP Website

To download the firmware from the HP website, go to <http://www.hp.com>.

This website provides the required loaders and instructions for downloading the firmware to a switch.

Technical Specifications



This appendix covers the following topics:

- [Dimensions](#), page 72
- [Power Supply Specifications](#), page 72
- [Environmental Requirements](#), page 73
- [Memory Specifications](#), page 73
- [Serial Port Specifications](#), page 74

Dimensions

Table 8 lists SAN Switch 2/32 dimensions.

Table 8: Physical Specifications

Dimension	Value
Height	2.58 in (65.5 mm)
Depth	23.06 in (585.6 mm)
Width	16.87 in (42.86 cm)
Weight (with both power supplies)	35.8 lb (16.2 kg)

Power Supply Specifications

Table 9 lists power supply specifications. The power supply is universal and capable of functioning worldwide without using voltage jumpers or switches. It meets IEC 61000-4-5 surge voltage requirements. The power supply has its own built-in fan for cooling, pushing the air towards the front of the switch.

Table 9: Power Supply Specifications

Specification	Value
Outlet	Correctly wired and earth-grounded
Maximum output	300 watts, with internal fans operating
Maximum system power consumption	190–220 watts (with some variation depending on transceiver vendor)
Input voltage	100–240 VAC (nominal 80% efficiency) auto-ranging
Input line frequency	47–63 Hz
Harmonic distortion	Active power factor correction per EN61000-3-2
BTU rating at 80% efficiency	220 watts / 0.8 x 3.412 Btu/hr/watts = 938 Btu/hr
Inrush current	Maximum of 15 amps for periods longer than 300 microseconds, at 50 degrees Celsius, hot or cold start
Input line protection	Fused in both hot and neutral lines, using independent fuses

Environmental Requirements

Table 10 lists the environmental ranges that are acceptable when the switch is operating, and the acceptable ranges when the switch is not operating.

Table 10: Environmental Requirements

Condition	Acceptable Range
Temperature (operating)	10°C to 40°C
Temperature (non-operating)	-25°C to 70°C
Humidity (operating)	20% to 85% RH non condensing, at 40°C, with maximum gradient with 10% per hour
Humidity (non-operating)	10% to 850% RH non-condensing, at 70°C
Altitude (operating)	0 to 3 km above sea level
Altitude (non-operating)	0 to 12 km above sea level
Shock (operating)	80 G, 2.4 ms, half sine
Shock (non-operating)	20 G, 11 ms, half sine wave

Memory Specifications

The switch utilizes the following memory.

- Main Memory (SDRAM): 128 MB per switch
- Flash Memory: 32 MB
- Boot Flash: 512KB of 8-bit for system boot
- Compact Flash: 256 MB

The centralized memory maximizes the overall switch throughput by guaranteeing full transmit and receive bandwidth to all Fibre Channel ports at all times.

Serial Port Specifications

Note: For dust and ESD (electrostatic discharge) protection, a cover is provided for the serial port and should be kept on the port whenever the serial port is not in use.

The serial port can be used to connect to a computer workstation to configure the switch IP address without connecting to the fabric. The serial port's parameters are 9600 baud, 8 data bits, no parity, 1 stop bit, and no flow control.

The port requires a straight serial cable with a female 9-pin subminiature-D connector. Only pins 2, 3, and 5 are supported; if pin 7 is used, the signal must always be driven high, using the pinouts listed in [Table 11](#).

Table 11: Cabling Pinouts if Pin 7 is Used

PIN	Signal	Description
1		
2	TxData	Transmit Data
3	RxData	Receive Data
4		
5	GND	Logic Ground
6		
7	CTS	Clear to Send
8		
9		

Regulatory Compliance Notices



This appendix discusses the following topics:

- [FCC EMC Statement \(USA\)](#), page 76
- [EMC Statement \(Canada\)](#), page 76
- [Germany Noise Declaration](#), page 76
- [VCCI EMC Statement \(Japan\)](#), page 77
- [BSMI EMC Statement \(Taiwan\)](#), page 77
- [RRL EMC Statement \(Korea\)](#), page 77
- [Laser Safety](#), page 78
- [Battery Replacement Notice](#), page 79

FCC EMC Statement (USA)

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense. The end user of this product should be aware that any changes or modifications made to this equipment without the approval of Hewlett-Packard could result in the product not meeting the Class A limits, in which case the FCC could void the user's authority to operate the equipment.

Regulatory Series Number: NA2106

EMC Statement (Canada)

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la Classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

EMC Statement (European Union)

This is a Class A product. In a domestic environment this product may cause radio interference, in which case the user may be required to take adequate measures.

Germany Noise Declaration

Schalldruckpegel $L_p = 46.1 \text{ dB(A)}$ Am Arbeitsplatz (operator position) Normaler Betrieb (normal operation) Nach ISO 7779:1999 (Typprüfung)

VCCI EMC Statement (Japan)

この装置は、情報処理装置等電波障害自主規制協議会（VCCI）の基準に基づくクラスA情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

BSMI EMC Statement (Taiwan)

警告使用者：這是甲類的資訊產品，在居住的環境中使用時，可能會造成射頻干擾，在這種情況下，使用者會被要求採取某些適當的對策。

RRL EMC Statement (Korea)

사용자 안내문 : A 급기기

이기는 업무용으로 전자파 적합등록을 받은 기기 이오니, 판매자 또는 사용자는 이점을 주의하시기 바라며, 만약 잘못 구입하셨을 때에는 구입한 곳에서 비업무용으로 교환하시기 바랍니다.

Laser Safety

A. Certification and Classification Information

When equipped with native Fibre Channel adapters, this product contains a laser internal to the small form factor pluggable (SFP) transceiver modules.

In the USA, the SFP module is certified as a Class 1 Laser product, conforming to the requirements contained in Department Of Health and Human Services (DHHS) regulation 21 CFR, Subchapter J. The certification is indicated by a label on the metal SFP housing.

Outside the USA, the SFP is certified as a Class 1 Laser product conforming to requirements contained in IEC 825-1:1993 and EN60825-1:1994, including Amendment 11:1996.

The SFP includes the following certifications:

- UL Recognized Component (USA)
- CSA Certified Component (Canada)
- TUV Certified Component (European Union)
- CB Certificate (Worldwide)

B. Product Information

Each communications port consists of a transmitter and receiver optical subassembly. The transmitter subassembly contains internally a semiconductor laser diode in the wavelength of either 850 nanometers (shortwave laser) or 1310 nanometers (longwave laser).

Class 1 Laser products are not considered hazardous.



WARNING: There are no user maintenance operations, service operations, or adjustments to be performed on the SFP module.

C. Usage Restrictions

Failure to comply with these usage restrictions may result in incorrect operation of the system and points of access may emit laser radiation above the Class 1 limits established by the IEC and U.S. DHHS.

Battery Replacement Notice

Your switch is equipped with a lithium manganese dioxide, a vanadium pentoxide, or an alkaline internal battery or battery pack. There is a danger of explosion and risk of personal injury if the battery is incorrectly replaced or mistreated. Unless specific replacement instructions are provided as part of this guide, replacement is to be done by an HP authorized service provider using the HP spare designated for this product. For more information about battery replacement or proper disposal, contact your HP authorized reseller or your authorized service provider.



WARNING: Your switch contains an internal lithium manganese dioxide, a vanadium pentoxide, or an alkaline battery. There is risk of fire and burns if the battery is not handled properly. To reduce the risk of personal injury:

- **Do not attempt to recharge the battery.**
 - **Do not expose to temperatures higher than 140°F (60°C).**
 - **Do not disassemble, crush, puncture, short external contacts, or dispose of in fire or water.**
-

Batteries, battery packs, and accumulators should not be disposed of with the general household waste. In order to forward them to recycling or proper disposal, please use the public collection system or return them to HP, your authorized HP partners, or their agents.

Electrostatic Discharge



To prevent damaging the system, be aware of the precautions you need to follow when setting up the system or handling parts. A discharge of static electricity from a finger or other conductor may damage system boards or other static-sensitive devices. This type of damage may reduce the life expectancy of the device.

To prevent electrostatic damage, observe the following precautions:

- Avoid hand contact by transporting and storing products in static-safe containers.
- Keep electrostatic-sensitive parts in their containers until they arrive at static-free workstations.
- Place parts on a grounded surface before removing them from their containers.
- Avoid touching pins, leads, or circuitry.
- Always make sure you are properly grounded when touching a static-sensitive component or assembly.

Grounding Methods

There are several methods for grounding. Use one or more of the following methods when handling or installing electrostatic-sensitive parts:

- Use a wrist strap connected by a ground cord to a grounded workstation or computer chassis. Wrist straps are flexible straps with a minimum of 1 megohm \pm 10 percent resistance in the ground cords. To provide proper ground, wear the strap snug against the skin.
- Use heel straps, toe straps, or boot straps at standing workstations. Wear the straps on both feet when standing on conductive floors or dissipating floor mats.
- Use conductive field service tools.
- Use a portable field service kit with a folding static-dissipating work mat.

If you do not have any of the suggested equipment for proper grounding, have an HP authorized reseller install the part.

Note: For more information on static electricity, or for assistance with product installation, contact your HP authorized reseller.



glossary

This glossary defines terms used in this guide or related to this product and is not a comprehensive glossary of computer terms.

AL_PA

Arbitrated Loop Physical Address; a unique 8-bit value assigned during loop initialization to a port in an arbitrated loop.

Alias Address Identifier

An address identifier recognized by a port in addition to its standard identifier. An alias address identifier may be shared by multiple ports.

Alias AL_PA

An AL_PA value recognized by an L_Port in addition to the AL_PA assigned to the port.

Alias Server

A fabric software facility that supports multicast group management.

API

Application Programming Interface; defined protocol that allows applications to interface with a set of services.

Arbitrated Loop

A shared 100 MBps or 200 MBps Fibre Channel transport structured as a loop. Can support up to 126 devices and one fabric attachment. See also *Topology*.

ASIC

Application Specific Integrated Circuit.

ATM

Asynchronous Transfer Mode; a transport used for transmitting data over LANs or WANs that transmit fixed-length units of data. Provides any-to-any connectivity, and allows nodes to transmit simultaneously.

AW_TOV

Arbitration Wait Time-out Value; the minimum time an arbitrating L_Port waits for a response before beginning loop initialization.

Bandwidth

The total transmission capacity of a cable, link, or system. Usually measured in bps (bits per second). May also refer to the range of transmission frequencies available to a network. See also *Throughput*.

BB_Credit

Buffer-to-buffer credit; the number of frames that can be transmitted to a directly connected recipient or within an arbitrated loop. Determined by the number of receive buffers available.

BER

Bit Error Rate; the rate at which bits are expected to be received in error. Expressed as the ratio of error bits to total bits transmitted. See also *Error*.

Block

As applies to Fibre Channel, upper-level application data that is transferred in a single sequence.

Bridge

Hardware that connects incompatible networks by providing translation for both hardware and software. For example, an ATM gateway can connect a Fibre Channel link to an ATM connection.

Broadcast

The transmission of data from a single source to all devices in the fabric, regardless of zoning.

Buffer-to-buffer Flow Control

Management of the frame transmission rate in either a point-to-point topology or in an arbitrated loop. See also *BB_Credit*.

Cascade

Two or more interconnected Fibre Channel switches. The recommended number of interswitch links is seven. See also *Fabric*, *ISL*.

Chassis

The metal frame in which the switch and switch components are mounted.

Circuit

An established communication path between two ports. Consists of two virtual circuits capable of transmitting in opposite directions. See also *Link*.

Command Line

Interface that depends entirely on the use of commands, such as through telnet or SNMP, and does not involve a GUI.

Community (SNMP)

A relationship between a group of SNMP managers and an SNMP agent, in which authentication, access control, and proxy characteristics are defined. See also *SNMP*.

Connection Initiator

A port that has originated a Class 1 dedicated connection and received a response from the recipient.

Connection Recipient

A port that has received a Class 1 dedicated connection request and transmitted a response to the originator.

CRC

Cyclic Redundancy Check; a check for transmission errors included in every data frame.

Credit

As applies to Fibre Channel, the number of receive buffers available for transmission of frames between ports. See also *BB_Credit*, *EE_Credit*.

Disparity

The relationship of ones and zeros in an encoded character. “Neutral disparity” means an equal number of each, “positive disparity” means a majority of ones, and “negative disparity” means a majority of zeros.

DLS

Dynamic Load Sharing; dynamic distribution of traffic over available paths. Allows for recomputing of routes when an Fx_Port or E_Port changes status.

Domain ID

As applies to SAN switches, a unique number between 1 and 239 that identifies the switch to the fabric and is used in routing frames. Usually automatically assigned by the switch, but can be manually assigned.

E_D_TOV

Error Detect Time-out Value; the minimum amount of time a target waits for a sequence to complete before initiating recovery. Can also be defined as the maximum time allowed for a round-trip transmission before an error condition is declared.

E_Port

Expansion Port; a type of switch port that can be connected to an E_Port on another switch to create an ISL. See also *ISL*.

EE_Credit

End-to-end Credit; the number of receive buffers allocated by a recipient port to an originating port. Used by Class 1 and 2 services to manage the exchange of frames across the fabric between source and destination. See also *End-to-end Flow Control*, *BB_Credit*.

EIA Rack

A storage rack that meets the standards set by the Electronics Industry Association.

Enabled Zone Configuration

The currently enabled configuration of zones. Only one configuration can be enabled at a time.

End-to-end Flow Control

Governs flow of class 1 and 2 frames between N_Ports. See also *EE_Credit*.

Error

As applies to Fibre Channel, a missing or corrupted frame, time-out, loss of synchronization, or loss of signal (link errors).

Exchange

The highest level Fibre Channel mechanism used for communication between N_Ports. Composed of one or more related sequences, and can work in either one or both directions.

F_Port

Fabric Port; a port that is able to transmit under fabric protocol and interface over links. Can be used to connect an N_Port to a switch.

Fabric Name

The unique identifier assigned to a fabric and communicated during login and port discovery.

Fabric

A Fibre Channel network containing two or more switches in addition to hosts and devices. May also be referred to as a switched fabric. See also *Topology*, *SAN*, *Cascade*.

FC-AL-3

The Fibre Channel Arbitrated Loop standard defined by ANSI. Defined on top of the FC-PH standards.

FC-FLA

The Fibre Channel Fabric Loop Attach standard defined by ANSI.

FCIA

Fibre Channel Industry Association. An international organization of Fibre Channel industry professionals. Among other things, provides oversight of ANSI and industry developed standards.

FCP

Fibre Channel Protocol; mapping of protocols onto the Fibre Channel standard protocols. For example, SCSI FCP maps SCSI-3 onto Fibre Channel.

Fibre Channel Transport

A protocol service that supports communication between Fibre Channel service providers.

FL_Port

Fabric Loop Port; a port that is able to transmit under fabric protocol and also has arbitrated loop capabilities. Can be used to connect an NL_Port to a switch.

FLOGI

Fabric Login; the process by which an N_Port determines whether a fabric is present, and if so, exchanges service parameters with it.

Frame

The Fibre Channel structure used to transmit data between ports. Consists of a start-of-frame delimiter, header, any optional headers, the data payload, a cyclic redundancy check (CRC), and an end-of-frame delimiter. There are two types of frames: Link control frames (transmission acknowledgements, etc.) and data frames.

FS_ACC

Fibre Channel Services Accept. The information unit used to indicate acceptance of a request for a Fibre Channel service.

FSP

Fibre Channel Service Protocol; the common protocol for all fabric services, transparent to the fabric type or topology.

FSPF

Fabric Shortest Path First; the routing protocol for Fibre Channel switches.

Full Fabric

The licensing that allows multiple E_Ports on a switch, making it possible to create multiple ISL links.

Full-duplex

A mode of communication that allows the same port to simultaneously transmit and receive frames.

Fx_Port

A fabric port that can operate as either an F_Port or FL_Port.

G_Port

Generic Port; a port that can operate as either an E_Port or F_Port. A port is defined as a G_Port when it is not yet connected or has not yet assumed a specific function in the fabric.

Gateway

A device such as a switch that connects different subnets together. A switch can be used as a gateway from the Ethernet to the Fibre Channel. Set the gateway address on one switch to the Fibre Channel IP address of another switch to enable the other switch to forward IP traffic to the Ethernet port on the second switch.

Gbps

Gigabits per second (1,062,500,000 bits/second).

GBps

GigaBytes per second (1,062,500,000 bytes/second).

HBA

Host Bus Adapter; the interface card between a server or workstation bus and the Fibre Channel network.

Hub

A Fibre Channel wiring concentrator that collapses a loop topology into a physical star topology. Nodes are automatically added to the loop when active and removed when inactive.

Idle

Continuous transmission of an ordered set over a Fibre Channel link when no data is being transmitted, to keep the link active and maintain bit, byte, and word synchronization.

ISL

Interswitch Link; a Fibre Channel link from the E_Port of one switch to the E_Port of another. See also *E_Port*, *Cascade*.

Isolated E_Port

An E_Port that is online but not operational due to overlapping domain IDs or nonidentical parameters (such as E_D_TOVs).

IU

Information Unit; a set of information as defined by either upper-level process protocol definition or upper-level protocol mapping.

L_Port

Loop Port; a node port (NL_Port) or fabric port (FL_Port) that has arbitrated loop capabilities. An L_Port can be in one of two modes:

- *Fabric mode* Connected to a port that is not loop capable, and using fabric protocol.
- *Loop mode* In an arbitrated loop and using loop protocol. An L_Port in loop mode can also be in participating mode or non-participating mode.

Latency

The period of time required to transmit a frame, from the time it is sent until it arrives.

Link Services

A protocol for link-related actions.

Link

As applies to Fibre Channel, a physical connection between two ports, consisting of both transmit and receive fibres.

LIP

Loop Initialization Primitive; the signal used to begin initialization in a loop. Indicates either loop failure or resetting of a node.

Looplet

A set of devices connected in a loop to a port that is a member of another loop.

MIB

Management Information Base; an SNMP structure to help with device management, providing configuration and device information.

Monitoring State

The state in which a port is monitoring the flow of information for data relevant to the port.

Multicast

The transmission of data from a single source to multiple specified N_Ports (as opposed to all the ports on the network).

Multimode

A fiber optic cabling specification that allows up to 500 meters between devices.

N_Port

Node Port; a port on a node that can connect to a Fibre Channel port or to another N_Port in a point-to-point connection.

NAA

Network Address Authority. An identifier that indicates the format of a network address.

Name Server

Frequently used to indicate Simple Name Server.

NL_Port

Node Loop Port; a node port that has arbitrated loop capabilities. Used to connect an equipment port to the fabric in a loop configuration through an FL_Port.

Node Name

The unique identifier for a node, communicated during login and port discovery.

Node

A Fibre Channel device that contains an N_Port or NL_Port.

Open Originator

The L_Port that wins arbitration in an arbitrated loop and sends an OPN ordered set to the destination port, then enters the Open state.

Open Recipient

The L_Port that receives the OPN ordered set from the open originator, and then enters the Open state.

Phantom Address

An AL_PA value that is assigned to an device that is not physically in the loop. Also known as phantom AL_PA.

A twenty-bit public address created for an 8-bit loop device to allow public devices to access it.

Phantom Device

A device that is not physically in an arbitrated loop, but is logically included through the use of a phantom address.

PLOGI

Port Login; the port-to-port login process by which initiators establish sessions with targets.

Point-to-point

A Fibre Channel topology that employs direct links between each pair of communicating entities. See also *Topology*.

Port Cage

The metal casing extending out of the optical port on the switch, and in which the SFP can be inserted.

Port_Name

The unique identifier assigned to a Fibre Channel port. Communicated during login and port discovery.

POST

Power On Self-Test; a series of tests run by a switch after it is turned on.

Private Device

A device that supports arbitrated loop protocol and can interpret 8-bit addresses, but cannot log into the fabric.

Private Loop

An arbitrated loop that does not include a participating FL_Port.

Private NL_Port

An NL_Port that communicates only with other private NL_Ports in the same loop and does not log into the fabric.

Protocol

A defined method and a set of standards for communication.

Public NL_Port

An NL_Port that logs into the fabric, can function within either a public or a private loop, and can communicate with either private or public NL_Ports.

Public Device

A device that can log into the fabric and support 20-bit addresses (or has 20-bit phantom addresses created for it by the switch).

Public Loop

An arbitrated loop that includes a participating FL_Port, and may contain both public and private NL_Ports.

QuickLoop

A feature that makes it possible to allow private devices within loops to communicate with public and private devices across the fabric through the creation of a larger loop.

May also refer to the arbitrated loop created using this software. A QuickLoop can contain a number of devices or looplets; all devices in the same QuickLoop share a single AL_PA space.

R_A_TOV

Resource Allocation Time-out Value; the maximum time a frame can be delayed in the fabric and still be delivered.

Route

As applies to a fabric, the communication path between two switches. May also apply to the specific path taken by an individual frame, from source to destination.

Routing

The assignment of frames to specific switch ports, according to frame destination.

RR_TOV

Resource Recovery Time-out Value; the minimum time a target device in a loop waits after a LIP before logging out a SCSI initiator.

RSCN

Registered State Change Notification; a switch function that allows notification of fabric changes to be sent from the switch to specified nodes.

RX_ID

Responder Exchange Identifier. A 2-byte field in the frame header used by the responder of the Exchange to identify frames as being part of a particular exchange.

SAN

Storage Area Network; a network of systems and storage devices that communicate using Fibre Channel protocols. See also *Fabric*.

Sequence

A group of related frames transmitted in the same direction between two N_Ports.

Service Rate

The rate at which an entity can service requests.

Single Mode

The fiber optic cabling standard that corresponds to distances of up to 10 km between devices.

SNMP

Simple Network Management Protocol. An internet management protocol that uses either IP for network-level functions and UDP for transport-level functions, or TCP/IP for both. Can be made available over other protocols, such as UDP/IP, because it does not rely on the underlying communication protocols.

Switch Name

The arbitrary name assigned to a switch.

Switch Port

A port on a switch. Switch ports can be E_Ports, F_Ports, or FL_Ports.

Switch

Hardware that routes frames according to Fibre Channel protocol and is controlled by software.

Target

A storage device on a Fibre Channel network.

Tenancy

The time from when a port wins arbitration in a loop until the same port returns to the monitoring state. Also referred to as loop tenancy.

Throughput

The rate of data flow achieved within a cable, link, or system. Usually measured in bps (bits per second).

Topology

As applies to Fibre Channel, the configuration of the Fibre Channel network and the resulting communication paths allowed. There are three possible topologies:

- Point to point - A direct link between two communication ports.
- Switched fabric - Multiple N_Ports linked to a switch by F_Ports.
- Arbitrated loop - Multiple NL_Ports connected in a loop.

Transfer State

The state in which a port can establish circuits with multiple ports without reentering the arbitration cycle for each circuit. This state can only be accessed by an L_Port in the Open state.

Translative Mode

A mode in which private devices can communicate with public devices across the fabric.

Transmission Character

A 10-bit character encoded according to the rules of the 8B/10B algorithm.

Transmission Word

A group of four transmission characters.

Trap (SNMP)

The message sent by an SNMP agent to inform the SNMP management station of a critical error.

Tunneling

A technique for enabling two networks to communicate when the source and destination hosts are both on the same type of network, but are connected by a different type of network.

U_Port

Universal Port; a switch port that can operate as a G_Port, E_Port, F_Port, or FL_Port. A port is defined as a U_Port when it is not connected or has not yet assumed a specific function in the fabric.

UDP

User Datagram Protocol; a protocol that runs on top of IP and provides port multiplexing for upper-level protocols.

ULP_TOV

Upper-level Time-out Value; the minimum time that a SCSI ULP process waits for SCSI status before initiating ULP recovery.

ULP

Upper-level Protocol; the protocol that runs on top of Fibre Channel. Typical upper-level protocols are SCSI, IP, HIPPI, and IPI.

Well-known Address

As pertaining to Fibre Channel, a logical address defined by the Fibre Channel standards as assigned to a specific function, and stored on the switch.

Workstation

A computer used to access and manage the fabric. May also be referred to as a management station or host.

WWN

Worldwide Name; an identifier that is unique worldwide. Each entity in a fabric has a separate WWN.

Xmitted Close State

The state in which an L_Port cannot send messages, but can retransmit messages within the loop. A port in the XMITTED CLOSE state cannot attempt to arbitrate.

Zone Configuration

A specified set of zones. Enabling a configuration enables all zones in that configuration.

Zone

A set of devices and hosts attached to the same fabric and configured as being in the same zone. Devices and hosts within the same zone have access permission to others in the zone, but are not visible to any outside the zone.

Zoning

A feature that runs on Fabric OS and allows partitioning of the fabric into logical groupings of devices. Devices in a zone can only access and be accessed by devices in the same zone.

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